METHODS OF SAMPLING AND TESTING
MT 321-04
PROCEDURE FOR DETERMINING MAXIMUM SPECIFIC GRAVITY OF BITUMINOUS PAVING MIXTURES - "RICE'S METHOD"
(Modified AASHTO T 209)

1 Scope:

1.1 This method covers the determination of maximum specific gravity of un-compacted bituminous paving mixtures commonly referred to as Rice Gravity.

2 Referenced Documents:

MT Materials Manual:
MT-303 Method of Sampling Bituminous Mixtures
MT-325 Method of Determining Moisture Content of Bituminous Mixtures Using Microwave Ovens

3 Apparatus:

3.1 *Balance* – with a capacity of 16,000 g sensitive to 0.1 g, to enable the maximum specific gravity of the un-compacted mix to be calculated to four significant figures (3 decimal places).

3.2 *Container* - Use a volumetric flask of 4000 ml as provided. The flask with a proper cover must be sufficiently strong to withstand a partial vacuum. The flask is provided with a rubber stopper and a hose connection. A small piece of fine wire mesh covering the hose opening will minimize loss of fines. The top surfaces of all containers shall be smooth and substantially plane.

3.3 *Vacuum Pump* - a motor driven vacuum pump, capable of maintaining at least 30 mm of Hg of vacuum, is used for removing air from the flask through the vacuum line (¼" dia. tubing).

3.4 *Water Bath* - Use the water bath (as provided) capable of maintaining a constant temperature of 25 ± 0.6ºC (77 ± 1ºF), to fill the 4000 ml flask.

3.5 *Calibration of Flask* - Calibrate the volumetric flask by determining the weight of the water required to fill it at 25 ± 0.6ºC (77 ± 1ºF). Accurate filling of the flask may be insured by using a glass capillary stopper which is inserted in the flask until water ceases to flow out of the top.

3.6 Te*st Samples* - The samples shall be obtained in accordance with MT-303.

4 Sample Size - Listed below:

Nominal Max. Size of Aggregate	Wt. of Sample
1"	2.5 Kg (5.50 lb.)
3/4"	2 Kg (4.40 lb.)
1/2"	1.5 Kg (3.30 lb.)
3/8"	1.0 Kg (2.20 lb.)
No. 4	0.5 Kg (1.10 lb.)

5 Procedure:

5.1 Separate the particles of the sample, taking care not to fracture the mineral particles, so that the fine aggregate portion is less than ¼ inch.

5 Procedure: (continued)

5.2 The sample may be heated if necessary to facilitate the break up of the sample.

NOTE 1 - If the sample is to be heated, it should be heated no more than 10 minutes at 149ºC (300ºF) or 5 minutes in the microwave oven. See microwave precautions on page 2 of 3 in MT-325.

5.3 Cool the sample to room temperature. Add sufficient water to flask (about 2000 ml) at 25 ± 0.6ºC (77 ± 1ºF). Weigh flask and water and designate weight as "D." (See Note 2). Record the weights on the worksheet. Add test sample and weigh. Designate the net weight of the sample as "A." (See Note 2).

NOTE 2 - "A" (net wt. dry sample) = *Weight of flask and water and sample - weight of flask and water*

"D" = *Weight of flask (cali*brated) and water

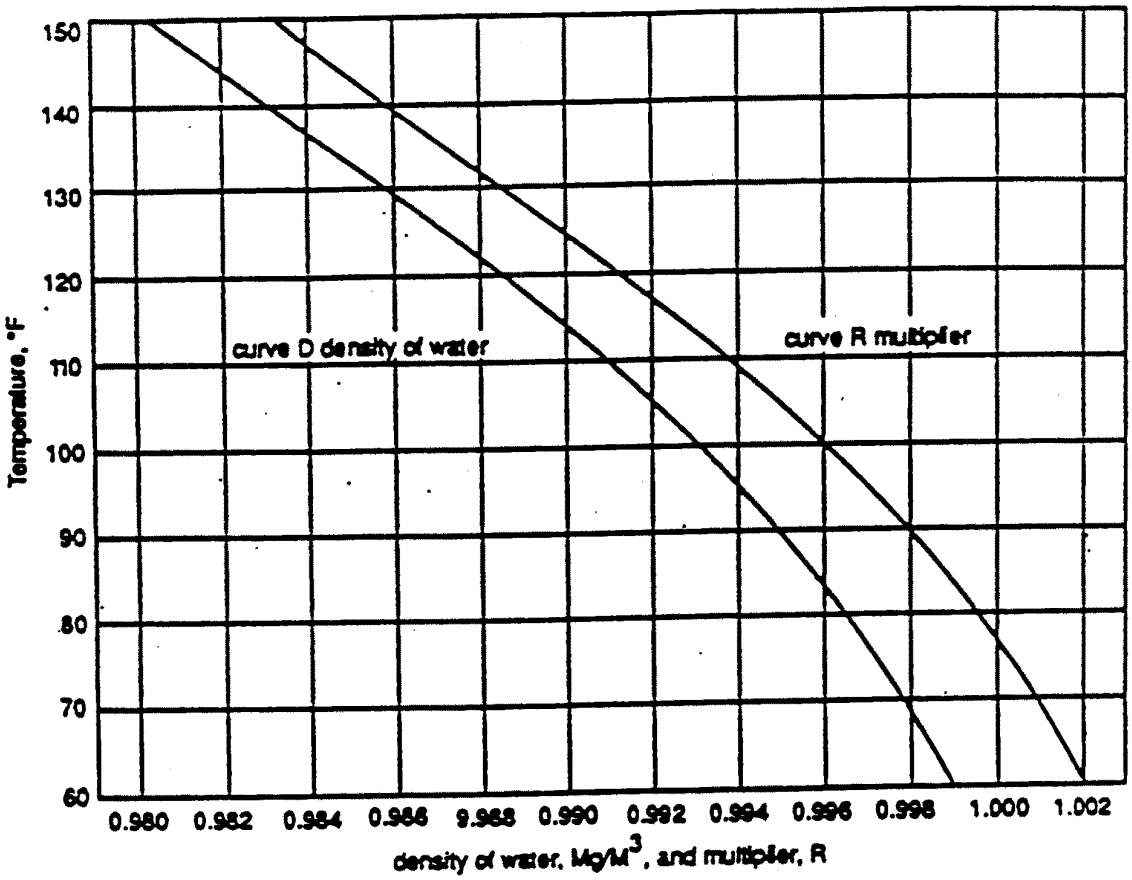
5.4 Remove entrapped air by subjecting the contents to a partial vacuum of 30 Hg mm or less gauge pressure for 15 ± 2 minutes. Agitate the container and contents either continuously by mechanical device or manually by vigorous shaking at intervals of about 2 minutes. (See note 3.)

NOTE 3 - If a wetting agent is desired, Aerosol OT in concentration of 0.01% or 1 ml of 10% solution in 1000 ml of water is recommended.

5.5 Flask Determination - Fill the flask with water (77 ± 1ºF) and bring contents to a temperature of 77 ± 1ºF in the constant temperature bath. Determine the weight of the flask filled with contents at 10 ± 1 min after completing the vacuum procedure 5.4. Designate the weight of flask with water and sample as E.

TEMPERATURE vs. WATER DENSITY CURVE

5.6 In lieu of using constant temperature water bath because of mechanical failure, a temperature vs. water density curve correction may be used. Determine the temperature of the water within flask and use the curve multiplier shown below, i.e., to correct the wt. of water at temperatures greater than or less than 77ºF.


150
140
130
120
110
100
90
80
70
60
Temperature, °F
curve D density of water
curve R multiplier
0.980
0.982
0.984
0.986
9.988
0.990
0.992
0.994
0.996
0.998
1.000
1.002
density of water, Mg/M3, and multiplier, R